IN THE UNITED STATES PATENT & TRADEMARK OFFICE

SPECIFICATIONS AND CLAIMS OF PATENT APPLICATION

TOOL FOR INSTALLING NAIL-PIN ANCHORS AND ANCHOR BOLTS

FIELD OF THE INVENTION

The present invention relates to a tool for installing nail-pin anchors and anchor bolts, in connection with a rotary hammer drill with a masonry drill bit.

BACKGROUND OF THE INVENTION

Nail-pin anchors and anchor bolts (sometimes called "quick bolts") are widely used in the construction industry. A nail-pin anchor has an anchor sleeve topped by a convex-shaped crown or dome. A nail is inserted into the sleeve through a hole in the dome. A hole is drilled in the concrete or brickwork. The anchor sleeve is inserted through a mounting hole in a structural piece (or through an opening in an angle iron bracket, etc.) and manually hammered into the hole in the concrete. Finally, the nail is driven into the sleeve, forming a wedge and setting the anchor. When a concrete or masonry anchor bolt with threads is installed, the threaded bolt is manually hammered into a hole in concrete. Then a nut is threaded onto the stem of the anchor.

Presently, the tools used for driving and setting a nail-pin anchor can be inefficient and even ineffective. Typically, a series of tools must be utilized. A drill is used to make

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the hole in the concrete. A hammer and/or screwdriver is used to hammer the anchor sleeve into the hole so that the dome rests on the surface of the concrete. A driving tool, such as a screwdriver, chisel, or center punch, and a hammer are then used to drive in the nail and set the anchor. The tools presently used can be difficult to align in order to hammer the anchor sleeve into the hole, and they may damage the dome of the anchor, which is often made from soft metal. Having to then switch to a different tool for driving the nail requires re-alignment, wasting time and causing the installer to lose his focus. When dozens of anchors must be set, the expenditure of time can be substantial. When used to drive in the nail, the presently-available tools may cause the nail to bend to one side and can even cause the nail head to chip off. Nail-pin anchors may not be properly set, resulting in a poor result, both structurally and cosmetically. The same problem arises when an installer uses a mallet or hammer to drive in the threaded bolt of an anchor bolt, or any other kind of anchor with a shaft. If the anchor setter improperly impacts the setting end of the threaded anchor, the stem may bend, making it difficult to thread the nut onto the stem. In hard-to-reach places, the installer using presently-available tools has little room to hammer in either a nail-pin anchor or an anchor bolt; in such circumstances, the anchor is even more likely to fail.

SUMMARY OF THE INVENTION

The present invention provides a tool for installing nail-pin anchors and anchor bolts which overcomes the problems of the prior art. The tool, made of steel parts, is designed so that novices can use it. The tool is safe and comfortable to use. It eliminates the need to switch from one tool to another, thereby saving time. It completely eliminates the need

to use hand-held hammers or mallets.

Using a rotary hammer drill with a masonry drill bit, the installer drills a hole in the concrete or masonry and inserts the end of a nail-pin anchor or anchor bolt into the hole. He then picks up the tool (with knurled outer surfaces to improve handing) and slides the socket end of the tool over the masonry drill bit until the tool rests against the drill's domed foundation. Then he rotates the tool a quarter of a turn (90°), temporarily locking the tool to the masonry drill bit. A spring clip can be used to provide an additional means of holding the tool onto the bit. As a result, the installer can use the tool to install anchors at any angle, including upside-down. Holding the rotary hammer drill with one hand, the installer grips the tool with the other hand and places the milled end against the anchor. The tool of the present invention can have a concave milled tip which fits over the dome of a nail-pin anchor sleeve. The installer squeezes the trigger of the drill, and the percussive force of the drill causes the tool to seat the dome of the anchor against the surface of the concrete and, simultaneously, set the nail into the sleeve. For anchors with threads, the tool will squarely impact the strike end of the stem of the threaded anchor and drive it in without bending it; the nut can then be easily threaded onto the stem.

The tool can be used without damaging the nail-pin anchors, the anchor bolts, or the surfaces of the objects being anchored. The installer is able to stay completely focused on installing each anchor. Finally, installation of each anchor takes considerably less time than does the process using presently-available tools.

It is an object of the present invention to provide a tool which is safe and comfortable to use.

Another object of the present invention is to provide a tool which is easy to use, regardless of an installer's experience.

Still another object of the present invention is to provide a tool which allows the installer to install nail-pin anchors and anchor bolts, using focused, efficient movements.

Yet another object of the present invention is to provide a tool which shortens the amount of time required to install each anchor.

A further object of the present invention is to provide a tool which fits over the drill bit of a rotary hammer drill, and which uses the percussive force of the drill and the tool's spring action to drive anchors into concrete or masonry.

A still further object of the present invention is to provide a tool which can be used without damaging either the anchors or the surfaces of the material to be anchored (often made from metal).

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front perspective view of the tool of the present invention, which has been installed onto a masonry drill bit of a rotary hammer drill; it is aligned with a nail-pin anchor, before anchoring an angle iron bracket to a concrete block.

Fig. 2 is an enlarged front perspective view of the assembled tool of the present invention.

Fig 3 is a sectional side plan view of the tool shown in Fig.2 taken along line 2-2.

Fig. 4 is an enlarged sectional view of the midportion of the tool shown in Fig. 3.

Fig. 5 is a sectional view of the tool illustrated in Fig. 4 taken along line 5-5.

Fig. 6 is an exploded view of the tool of the present invention, showing the parts of

the tool and the order of its assembly.

Fig. 7A-7D are sectional side plan views of the tool of the present invention as it is used with the rotary hammer to install a nail-pin anchor.

Fig. 8A-8D are sectional side plan views of the tool of the present invention as it is used with a rotary hammer to install an anchor bolt.

Fig. 9 is a detail of the nail-pin anchor in Fig. 7B.

Fig. 10 is a detail of the anchor bolt in Fig. 8B.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in Fig. 1, the anchor setting tool **1** of the present invention is used with a rotary hammer drill **2** to drive a nail-pin anchor **3** through a hole in an angle iron bracket **4** and into a drilled hole in a concrete block **5** and set it.

Fig. 2 shows the assembled anchor setting tool **1**. The body **6**, which serves as the hand grip, is made from a hard metal such as 1 inch Barstock grade metal (such as 4140). The body **6** has knurls **7** on its surface to prevent slippage of the tool **1**, as well as a tapered end **8**, so that the tool **1** can be used to set anchors in a tight area, such as a channel. Inserted into the upper end of the body **1** is a ram **9** having a stem **10** and a socket end **11**, into which has been inserted a masonry drill bit **12**.

The sectional view in Fig. 3 shows the elements cooperating inside the body **6** of the tool **1**. The tapered end **8** optionally can be milled with a concave tip **13** to fit over the dome of a nail-pin anchor or rivet. Alternatively, the tip **13** can be flat (not shown). In either case, the length of the nail or stem of an anchor fits into the opening at the tip **13** of the body **6**. The internal cylinder **14** of the body **6** has been milled and machined to have

an internal base **15**, upon which an end of the steel-wire spring **19** rests. The stem **18** of the driver **16** has been inserted into the spring **19**, and the base **17** of the driver **16** acts as the final foundation for the spring **19**. Resting against the base **17** of the driver **16** is the lower end of the ram **9**, which has been milled and machined to have the same outer diameter as that of the base **17** of the driver **16**. Both the ram **9** and the driver **16** are designed to slide back and forth within the body **6** of the tool **1**; they will move up and down with the percussive action of the rotary hammer drill **2**. Within a cylindrical opening inside ram **9** is a keyed bearing **20**, which is held in place by a spring steel snap ring **21**. The ram **9** itself, as well as the driver **16** and the spring **19**, is held inside the body **6** by spring steel snap ring **22**. A "window" opening, machined on one side of the ram **9** accommodates a spring steel clip **23**, which presses against the masonry drill bit **12** which has been inserted into the socket end **11** of the ram **9**, through the stem **10**, and into the keyed bearing **20**. The clip's **23** moderate pressure on the masonry drill bit **12** provides additional means of securing the tool **1** to the masonry drill bit **12**. The socket end **11** of the ram **9** has been machined and drilled to the depth required so that the bullnose foundation **24** of the masonry drill bit **12** can rest on its internal shoulder **25**. When the masonry drill bit **12** turns, it rotates freely within the socket end **11**, the ram **9**, and the keyed bearing **20**; only the keyed bearing **20** can turn with it (acting like a rotor), so that the body **6** of the tool **1** remains stationary in the installer's hand while an anchor is being installed.

Fig. 4 shows the midportion of the body **6** of the tool **1** in greater detail. The snap ring **21**, which holds the keyed bearing **20** in place, fits into a groove **32** milled inside the cylindrical sleeve **30** of the ram **9**. The keyed bearing **20** fits under internal base

foundation **31** of the cylinder **33** of the ram **9**. Inside the window **34** in the cylinder **33** is the clip **23**. Snap ring **22** fits into a groove **36** inside the body **6**, holding the ram **9** in place. The winged tip **35** of the masonry drill bit **12** has been inserted into the keyed bearing **20** inside the ram **9**. The keyed bearing **20** allows the masonry drill bit **12** to spin freely within the ram **9**, eliminating the possibility of shearing of the winged tip **35**.

The sectional view in Fig. 5 shows the slot **37** in the keyed bearing **20**, which allows the keyed bearing **20** to act as a temporary lock for the winged tip **35** of the masonry drill bit (**12**). The snap ring **21** holds the keyed bearing **20** inside the sleeve **30** of the ram **9**, which is disposed inside the body **6**. The ends of the slot **37** in the keyed bearing **20** accommodate the winged tip **35**, which is slid down to the bottom of the keyed bearing **20**, past the snap ring **21**. The body **6** is then turned ninety degrees (90°), from the unlocked position **38** to the locked position **39**. Locking the masonry drill bit keeps the tool from falling off the drill bit.

The exploded view in Fig. 6 shows the parts of the tool **1** prior to assembly. All parts of the tool **1** are made from steel. The spring **19** slips inside the body **6**, and the driver **16** is inserted inside the spring **19**. The slot **37** in the keyed bearing **20**, which accommodates the winged tip **35** of the masonry drill bit **12**, can be more easily seen. The keyed bearing **20** fits inside the sleeve **30** of the ram **9**, with the snap ring **21** holding it in place. Inside the window **34** is the spring clip **23**, which is held in place by a threaded screw **40**. The ram **9** is inserted into the body **6** of the tool **1**, and the snap ring **22** fitted inside the groove inside the body **6** to hold the ram **9** in place. The stem **42** of the masonry drill bit **12** is inserted into the socket end **11** of the ram **9** until the bullnose foundation **24** of the drill bit

rests against the internal shoulder **(25)** of the socket end **11**, with the winged tip **37** of the masonry drill bit **12** extending past the lower opening of the slot **37** in the keyed bearing **20**, at which point the installer can turn the body **6** of the tool **1** ninety degrees (90°) to temporarily lock the tool **1** onto the masonry drill bit **12**. The splined end **41** of the masonry drill bit **12** locks inside the end of a rotary hammer drill **2**, which acts with the tool **1** as an anchor setter.

Figs. 7A through 7D show sectional plan views of the tool **1** in use in the installation of an nail-pin anchor **3**.

In Fig. 7A, a rotary hammer drill **2** with a masonry drill bit **12** is used to drill a hole in a piece of concrete **5** to the depth required to install a particular nail-pin anchor.

As shown in Fig. 7B, the masonry drill bit **12** has been pulled out of the hole **44** and inserted into the body of the tool **1**, passing through the keyed bearing **20** inside the ram **9**, and has been temporarily locked in place (as described supra). A nail-pin anchor **3** with a convex dome has been inserted into the hole **44**, under the concave tip **13** of the tool **1**. The ram **9** rests against the base **17** of the driver **16**, the stem **18** of which has been inserted into spring **19**.

As shown in Fig. 7C, the hammering action of the rotary hammer drill **2** against the ram **9**, which slides up and down inside the body **6** of the tool **1**, has caused the sleeve **3a** of the anchor to be driven into the hole **44**, leaving nail **3b**. The percussive action of the rotary hammer drill **2** can be seen with the up and down movement of the stem **10** of the ram **9**.

As shown in Fig. 7D, almost simultaneously with the action shown in Fig. 7C, the

hammering action of the rotary hammer drill **2** has moved the ram **9** to force the driver stem **18** to act like a hammer, with the driver base **17** compressing the spring **19** against the internal base **15**. As a result, the driver stem **18** drives the nail **3b** into the anchor sleeve **3a**, completing installation of the nail-pin anchor **3**. Releasing the trigger of the rotary hammer drill **2** allows the spring **19** to expand back to its original position. In order to remove the tool **1** from the masonry drill bit **12**, the installer simply turns the body **6** of the tool **1** ninety degrees (90°) and slides the tool **1** off of the masonry drill bit **12**.

Figs. 8A through 8D show sectional plan views of the tool **1** in use in the installation of a concrete or masonry anchor bolt **45**.

In Fig. 8A, a rotary hammer drill **2** with a masonry drill bit **12** is used to drill a hole in a piece of concrete **5** to the depth required to install a particular anchor bolt.

As shown in Fig. 8B, the masonry drill bit **12** has been pulled out of the hole **44** and inserted into the body of the tool **1**, passing through the keyed bearing **20** inside the ram **9**, and has been temporarily locked in place (as described <u>supra</u>). An anchor bolt **45** has been inserted into the hole **44**, with its upper end inside the flat tip **43** of the tool **1**. The ram **9** rests against the base **17** of the driver **16**, the stem **18** of which is has been inserted into spring **19**.

As shown in Fig. 8C, the hammering action of the rotary hammer drill **2** against the ram **9**, which slides up and down inside the body **6** of the tool **1**, is beginning to cause the anchor bolt **45** to be driven into the hole **44**. The percussive action of the rotary hammer drill **2** can be seen with the up and down movement of the stem **10** of the ram **9**.

As shown in Fig. 8D, the hammering action of the rotary hammer drill **2** has moved

the ram **9** to force the driver stem **18** to act like a hammer, with the driver base **17** compressing the spring **19** against the internal base **15**. As a result, the driver stem **18** squarely impacts the strike end of the stem of the anchor bolt **45** and drives it into the hole **44**. Releasing the trigger of the rotary hammer drill **2** allows the spring **19** to expand back to its original position. In order to remove the tool **1** from the masonry drill bit **12**, the installer simply turns the body **6** of the tool **1** ninety degrees (90°) and slides the tool **1** off of the masonry drill bit **12**.

As the detail drawing shows in Fig. 9, prior to its installation, the lower part of the anchor sleeve **3a** has been inserted into the hole **44** in the piece of concrete **5**, with its dome resting against the concave tip **13** of the tapered end **8** of the tool **1**, and the nail **3b** inside the opening of the tool **1**.

As the detail drawing shows in Fig. 10, prior to its installation, the lower end of the anchor bolt **45** has been inserted into the hole **44** in the piece of concrete **5**, with the upper end of the anchor bolt **45** having been inserted into the opening at the flat tip **43** of the tapered end **8** of the tool **1**.